

MATH 112
Exam I
April 27, 2006

Name _____

Student ID # _____

Section _____

HONOR STATEMENT

“I affirm that my work upholds the highest standards of honesty and academic integrity at the University of Washington, and that I have neither given nor received any unauthorized assistance on this exam.”

SIGNATURE: _____

1	12	
2	13	
3	12	
4	13	
Total	50	

- Your exam should consist 4 problems. Check that you have a complete exam.
- Turn your cell phone OFF and put it away for the duration of the exam.
- Unless otherwise indicated, you must show your work. The correct answer with no supporting work may result in no credit.
- If you use a guess-and-check method when an algebraic method is available or read a value from a graph on your calculator, you may not receive full credit.
- Put your name on your sheet of notes and turn it in with the exam.

GOOD LUCK!

1. (12 points) Compute the derivative. Do not simplify.

(a) $z = \frac{e^x + 4x}{x^{5/6}}$

(b) $g(u) = (u \ln(u) + 1)^4$

(c) $y = \sqrt{e^{3t^2} + 1}$

2. (13 points) A moving object has distance function $d(t)$, where t is in minutes and distance is in yards. We do not have a formula for $d(t)$, but the formula for the change in distance from $t = m$ to $t = m + h$ is

$$d(m + h) - d(m) = -2mh - h^2 + 20h.$$

- (a) Compute the change in distance from $t = 2$ to $t = 8$.

ANSWER: _____yards

- (b) Find the car's average speed from $t = 5$ to $t = 5.01$.

ANSWER: _____yards per minute

- (c) Find a time at which the instantaneous speed is 10.5 yards per minute.

ANSWER: $t =$ _____minutes

3. (12 points) You sell Things. The total revenue and total cost functions are given by:

$$TR(q) = -25q^2 + 200q \quad \text{and} \quad TC(q) = q^3 - 6q^2 + 17q + 50,$$

where q is in *thousands of Things* and TR and TC are in *thousands of dollars*.

- (a) Write out the formula for $TR(4+h) - TR(4)$. Simplify as much as possible.

ANSWER: $TR(4+h) - TR(4) =$ _____

- (b) Use the derivative rules to find the formulas for $MR(q)$ and $MC(q)$.

$MR(q) =$ _____

$MC(q) =$ _____

- (c) What is the smallest value of $MC(q)$?

ANSWER: \$ _____

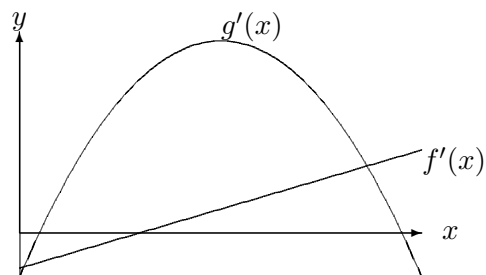
- (d) Find the quantity at which profit is largest.

ANSWER: $q =$ _____ thousand Things

4. (13 points)

The graphs to the right are the *derived graphs* for two functions $f(x)$ and $g(x)$. The derived graphs shown are given by the formulas:

$$f'(x) = 5x - 15 \text{ and } g'(x) = -4x^2 + 40x - 19.$$



(a) Give the longest interval over which the function $g(x)$ is increasing.

ANSWER: from $x =$ _____ to $x =$ _____

(b) Find all values of x at which each of the following functions has a horizontal tangent line:

i. $f(x)$

ANSWER: $x =$ _____

ii. $g'(x)$

ANSWER: $x =$ _____

(c) Give the value of x in the interval from $x = 0$ to $x = 2$ at which the graph of $f(x)$ is highest. Explain your choice.

ANSWER: $x =$ _____

(d) What is the approximate value of $\frac{g(3.00001) - g(3)}{0.00001}$?

ANSWER: _____